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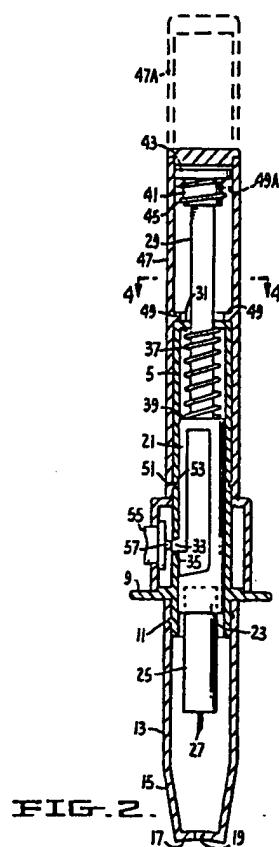
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(54) Blood sampling instrument.

(57) A blood sampling instrument for drawing a few drops of blood from a finger or the like by needle 27 in holder 25, is provided wherein the sample device consists primarily of a tubular member 5 which conceals all of the working parts and which has a flange 9 thereon so that it can be easily held by a patient and pressed at 17 against a finger while releasing a trigger mechanism 57, 33 to actuate a plunger 21, biased by spring 37, within the instrument. The instrument can be cocked ready for use by pulling back a retractable outer sleeve 47.

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Title: BLOOD SAMPLING INSTRUMENT

The present invention relates to a blood sampling instrument for drawing a few drops of blood from a finger or the like. Such instruments are commonly used to draw blood samples for analytical purposes and 5 particularly are used by diabetics who must monitor glucose levels.

A number of instruments have been proposed in the past but none has been fully satisfactory. Some instruments have been hard to hold and to maintain in a proper 10 position while actuating a trigger. The device of the present invention has an annular flange thereof so that it can be easily held in the hand and pressed against a finger. A trigger is provided adjacent to the flange so that it is easy to disengage the plunger, carrying a 15 needle, while the device is pressed against a finger.

Other devices have had moving parts which are exposed. This tends to scare the patient and also, if certain parts are exposed, they may rub against a patient's hand, unless care is taken, which will slow down the 20 action of the plunger, preventing proper penetration.

Other devices which have been proposed have multiple

triggers which must be simultaneously pressed while the device of the present invention has only a single trigger button so that it is easy to use and can be held in either hand. This is particularly advantageous for 5 lefthanded patients.

Another advantage of the present invention is that the flange which the patient engages is fairly close to the tip so that the accuracy and sureness of placement are greater.

10 Another advantage of the present invention is the tip is heldly securely by threads but it is easy to remove if desired. Thus, it is easy to change the needle assembly. Further, since the tip of the nosepiece can be made in various sizes, it is easy to provide replaceable tips 15 suitable for either adults or children.

A further advantage of the present invention is it has a tubular sheath which both cocks the device and shields the plunger so that the patient's hand cannot absorb energy from the movement of the plunger, which might 20 prevent proper skin penetration. The sheath is provided with a detent to give a positive indication that it has been fully retracted after a cocking operation.

A still further advantage of the present invention is the employment of a bounce back spring so that once the

needle penetrates, it is immediately retracted, keeping it clean, safe and out of the way.

Other features and advantages of the invention will be described below with reference to the accompanying 5 drawings, in which:-

Figure 1 is a perspective view of a device embodiment the present invention showing it in use by a patient;

Figure 2 is an enlarged side view, partly in section on the line 2-2 of Figure 1 showing the device in cocked 10 position in solid lines and movement of the outer sheath in phantom during a cocking operation;

Figure 3 is a view similar to Figure 2 showing the device just after it has been operated;

Figure 4 is a section on the line 4-4 of Figure 2.

15 Referring now to the drawings by reference characters, the device of the present invention includes a fixed tubular member 5 which has an annular collar 7 attached thereto as well as an annular flange 9 located at the forward or distal end of the instrument. The forward 20 portion of the member 5 is threaded as at 11 for the reception of a hollow nosepiece 13. Nosepiece 13 is tapered towards the front as at 15 and has a generally

flat or slightly curved forward surface 17 with a small central hole 19.

Slidably mounted within the tubular member 5 is a plunger member 21 which has a socket 23 at its forward 5 end for receiving a needle holder 25 which in turn holds the needle proper 27. A combination of parts 25 and 27 is a standard item available on the market, one brand of which is sold under the trade name of MONOLET.

Plunger 21 has a square shaft 29 extending to the rear 10 and this passes through a square opening in an abutment 31 which is formed as part of the tubular member 5. This is best seen in Figure 4; the square shaft prevents rotation of the plunger. The plunger 21 also has a small finger 33 which is adapted to extend into and be engaged 15 in a hole 35 in the tubular member 5. A main spring 37 which extends between the shoulder 31 of the tubular member 5 and a shoulder 39 formed on plunger 21 tends to bias the plunger 21 towards the forward end of the instrument, i.e. down in Figure 2 and 3. At the rear of 20 the shaft 29 is a collar 41 having a flange 43 which retains a bounce back spring 45.

Slidably mounted on the member 5 is an outer sleeve 47 which has an inturned abutment 49. Sleeve 47 also has a small projection 51 which fits into a mating notch 53 in the tubular member 5, the function of which will later

be described.

A trigger 55 having a pin 57 is slidably mounted in collar 7 with the pin being adapted to press against finger 33 and push it down through the hole 35.

- 5 Action of the device will now be described. When the device is cocked, it is in the position shown in Figure 2 with spring 37 compressed between the sholders 31 and 39. One presses the nosepiece 13 against a finger 61 by placing the fingers of the other hand against the flange 9 to insure good contact between the nosepiece 13 and finger 61. Now one presses trigger 55 which pushes the finger 33 out of the hole 35 so that the main spring, acting against the shoulder 39, pushes the plunger out to the position shown in Figure 3 wherein the needle 27
- 10 momentarily extends out of the hole 19 and into the finger 61. This movement is in the direction shown by arrow 63. As this happens, bounce back spring 45 is compressed which causes plunger 21 to spring back slightly in the direction shown by arrow 65 so that the
- 15 needle 27 is withdrawn through the hole 19 so that it is kept clean and out of the way. It will be noted that during this operation, there was no external movement of any of the parts. The patient was not aware of the movement of the needle, nor is it possible that the
- 20 plunger might brush against the patient and slow down the action of the plunger.

When one wishes to operate the device, the main spring 37 is again cocked, as is shown in phantom in Figure 2. One pulls back on sleeve 47 to the position shown at 47A. This moves abutment 49 to the position shown in 5 phantom at 49A, pushing against flange 43, thus pulling back plunger 21, at which time the finger 33 engages in and is held by the hole 35 so that the spring 37 is now again compressed. This leaves the sleeve 47 free and the patient can now push it back down against the collar 7.

10 The detent 51 engaging in the notch 53 gives a little "click" as the sleeve is pushed back down into the rest position, giving the patient both an audible and tactile indication that the sleeve has been fully returned to rest position and will not interfere with the next

15 operation. Also, the detent serves to hold the sleeve in place and to not allow it to freely slide up and down. At the same time, button 55 is raised so that the patient can tell at a glance that the device is cocked and ready for a repetition of the operation.

20 It was previously mentioned that the nosepiece 31 is threadably mounted by means of threads 11 on the tubular member 5. Thus, it is easy to remove the nosepiece 13 for cleaning or replacement of the needle assembly 25 and 27. Also, the nosepiece can be made in various sizes 25 so that one can secure deep penetration for an adult or relatively shallow penetration for a child.

Many variations can be made in the exact structure shown without departing from the scope of this invention as defined in the appended claims.

CLAIMS

1. A blood sampling instrument designed to be hand held and being adapted to prick a finger or the like to draw a few drops of blood, comprising in combination:
  - (a) a tubular member having a hollow nosepiece at the distal end and a spring chamber at the proximal end,
  - 5 (b) an annular collar and annular flange immediately behind said nosepiece,
  - (c) a hollow sleeve surrounding said spring chamber,
  - (d) a plunger mounted for reciprocation within said 10 tubular member.
  - (e) a main spring mounted within said spring chamber and biasing said plunger toward said nosepiece,
  - (f) a socket for receiving a needle on the distal end of said plunger.
  - 15 (g) a finger on said plunger to engage an aperture in said tubular member and hold said plunger when said plunger is drawn away from said nosepiece,
  - (h) a trigger button extending from said collar and having means to engage the finger on said plunger,
  - 20 (i) plunger cocking means on said sleeve to pull said plunger away from said nosepiece and engage said finger whereby
  - (j) the nosepiece of said instrument can be pressed against a finger by exerting pressure on said flange
  - 25 while pressing said trigger to release said plunger and

cause said needle to be driven out of said nosepiece.

2. The instrument of claim 1 wherein said nosepiece is removably mounted whereby nosepieces of different lengths can be mounted on the instrument.
- 5 3. The instrument of claim 1 wherein said sleeve can be retracted to lie against said shoulder after cocking operation whereby said sleeve will not move when said plunger is released and protects the plunger from contact with the holding hand.
- 10 4. The instrument of claim 3 having a click stop when said sleeve is fully retracted to give an audible and tactile indication that the sleeve is retracted and to restrain the sleeve against easy sliding movement.
5. The instrument of claim 1 having a bounce back spring 15 on the proximal end of said plunger whereby said needle is drawn back into the nosepiece after initially extending beyond the nosepiece.

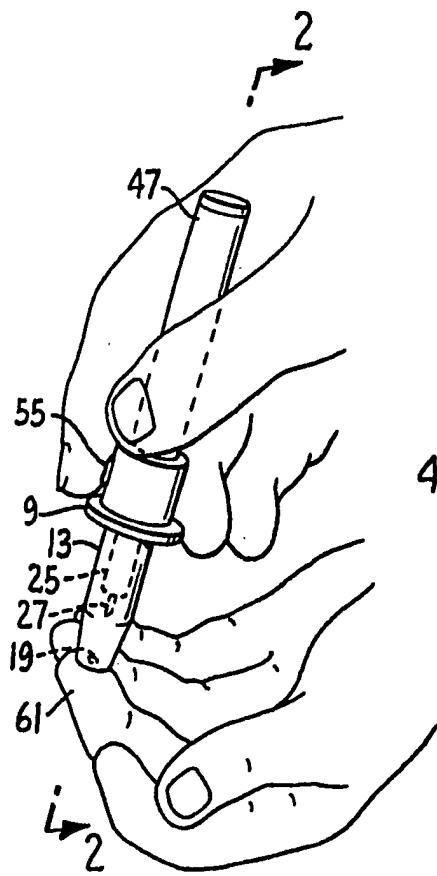


FIG. 1.

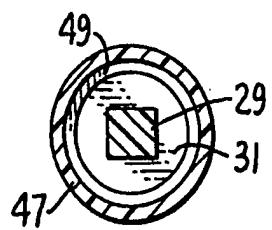


FIG. 4.

FIG. 2.

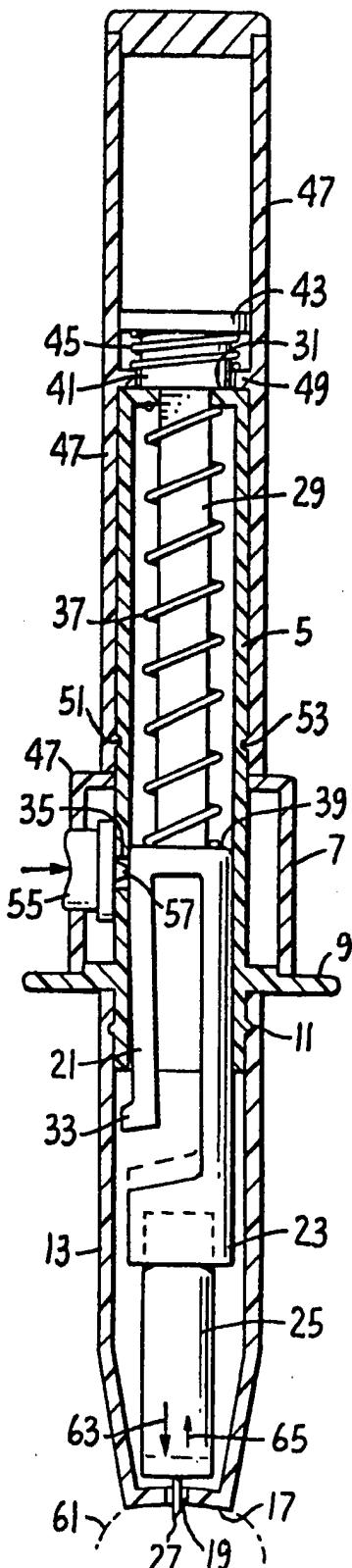
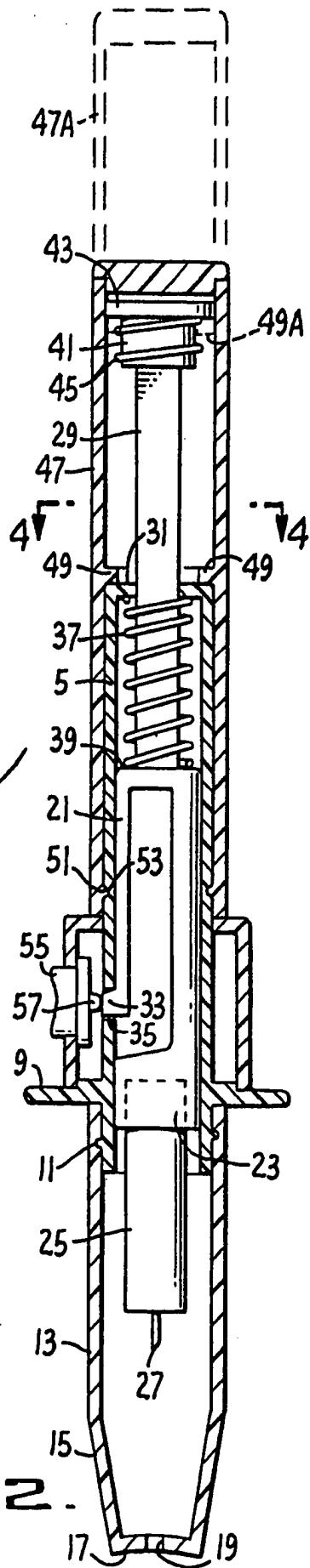


FIG. 3.



| DOCUMENTS CONSIDERED TO BE RELEVANT  |   |                   | CLASSIFICATION OF THE APPLICATION (Int. Cl.?) |  |  |
|--|---|-------------------|---|--|--|
| Category   | Citation of document with indication, where appropriate, of relevant passages   | Relevant to claim |   |  |  |
| P, Y   | EP-A-0 081 665 (BECTON, DICKINSON & CO.)<br>* Abstract; figures 4,7-11; page 7, lines 13-30; page 9, line 7 - page 10, line 20 *                  | 1,5               | A 61 B 5/14                                   |  |  |
| Y  | ---<br>GB-A-2 074 453 (ENSTROM et al.)<br>* Abstract; figures 1-3; page 1, line 115 - page 2, line 71; page 3, lines 29-50 *                      | 1,4               |   |  |  |
| A  | ---<br>EP-A-0 061 102 (BECTON, DICKINSON & CO.)<br>* Abstract; figures 7-9; page 5, line 25 - page 6, line 4; page 7, line 30 - page 9, line 11 * | 1,5               |   |  |  |
| A  | ---<br>FR-A- 887 359 (DUMAS)<br>* Figures 1,2; page 1, line 47 - page 2, line 55 *  | 1,2,5             | TECHNICAL FIELDS<br>SEARCHED (Int. Cl.?)      |  |  |
| A  | ---<br>EP-A-0 068 864 (SHERWOOD MEDICAL CO.)<br>* Abstract; figures 1,2,4-6; page 5, lines 12-31; page 10, line 9 - page 11, line 6 *             | 1,5               | A 61 B  |  |  |
| A  | ---<br>US-A-2 664 086 (TRANSUE)<br>* Figures 1-6; column 4, lines 11-71 *   | 2-4               |   |  |  |
| The present search report has been drawn up for all claims                       |   |                   |   |  |  |
| Place of search  | Date of completion of the search  | Examiner          |   |  |  |
| THE HAGUE  | 05-04-1984  | CHEN A.H.         |   |  |  |
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